GREENHOUSE GASES

Concentrate on CO_2, Not Methane From Cows

by Thomas E. Drennen and Duane Chapman

For decades, scientists have warned that the continued addition of various gases to the atmosphere, commonly referred to as greenhouse gases, could result in increased global temperatures due to the ability of these gases to trap and prevent infrared radiation from leaving the earth's atmosphere. These gases include carbon dioxide (CO_2), methane (CH_4), chlorofluorocarbons (CFCs), and nitrous oxide (N_2O). For CO_2 alone, primarily released from the burning of fossil fuels, scientists predict that for a doubling of atmospheric levels over pre-industrial levels, the earth's surface temperature will increase from 1.5 to 4.5 degrees Celsius.

While CO_2 is the main greenhouse gas, it is responsible for only 55 percent of the change in climate forcing from 1980 to 1990 (Figure 1). For this reason, many argue that to simply limit CO_2 emissions is not enough if the goal is to avert future climate change.

International Response

In response to the perceived threat to the world's climate, steps have been taken towards limiting climatic change. At the Western Economic Summit in Texas in July 1990, leaders agreed that a framework convention regulating greenhouse gases should be completed in time for the 1992 Earth Summit Convention. In

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turn, under UN auspices, the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC) began a series of five meetings in preparation for the 1992 Conference.

After four meetings of the INC, there are major disagreements. Industrialized countries are divided as to whether the convention should contain specific dates and targets. The U.S. position is that any framework convention should be very broad and should not contain timetables or levels. The EC and Canada favor targets stabilizing CO_2 emissions at 1990 levels by 2000. Japan calls for the "best efforts" by industrial countries at meeting stabilization goals. And developing countries worry that any agreement might prevent them from ever achieving Western-style living standards.

The United States' basic concern is that agreeing to limits in the emissions of carbon dioxide could severely curtail future economic growth or that an agreement might require large payments to developing countries to help them meet the terms of the agreement. One U.S. response to the problem has been to propose what is referred to as the comprehensive approach —that any agreement cover all of the gases, not just carbon dioxide.

An example of how a comprehensive agreement might work was put forth by the U.S. Department of State in February 1990. First each gas would be assigned a weight. One suggested weighting scheme, based solely on each gas's ability to absorb infrared radiation, would assign each molecule of CO_2 a rating of 1, each molecule of methane (CH_4) a rating of 25, and each molecule of CFC-12 a rating of 15,000. A reduction goal would then be established giving each country broad latitude as how best to meet the target given its particular needs and cultural values. One country might meet its target by reducing CO_2 emissions in the energy sector; another might find it more efficient to control methane emissions from its bovine or termite population, or its rice paddies.

This approach appeals to many groups, including economists who have long argued that emissions trading schemes result in more efficient outcomes than specific regulations on a gas or a source.

➢ Cows are said to be a significant environmental threat, partially responsible for altering the earth's climate by emitting methane, a potent greenhouse gas. And with diplomats from around the world preparing for a UN-sponsored June 1992 Earth Summit Conference in Rio de Janeiro, policymakers are looking at the bovine animal as one possible area for negotiation.

We believe that agreement on CO_2 reduction alone should be the first step. Agreements on other greenhouses gases, such as methane, could follow at a later date as warranted.

Table 1: Natural methane and rice paddies are largest sources of methane.

Annual emissions of methane into the atmosphere

Source	Quantity Million MT	% of Total
Natural Wetlands (includes bogs, swamps, tundras)	115	22
Rice Paddies	110	21
Ruminant animals	80	15
Biomass Burning (includes fuel wood, agricultural burning, forest fires)	55	10
Gas Drilling, Venting Transmission	45	8
Termites	40	7
Landfills	40	7
Coal Mining	35	7
Oceans	10	2
Fresh Waters	5	1
Total	**535**	**100**

Source: Cicerone and Oremland. "Biogeochemical Aspects of Atmospheric Methane." 1988. (A metric ton equals 1.1 U.S. ton).

The Bovine Issue

Under a comprehensive agreement, bovine animals, as well as other biological sources, are targets for greenhouse gas reduction. However, the importance of bovine methane as a greenhouse gas is overrated. There are four basic reasons we think that the initial efforts should remain on controlling CO_2 emissions.

• **Bovine Animals Recycle Carbon.** Current estimates of methane emissions from biological sources in general have focused solely on the gross emissions of the gas, ignoring the biological and chemical cycling which occurs. Methane released from a farm animal is not equal nor directly comparable to methane released from other sources, such as natural gas leakages. In the latter case, carbon (in the form of methane) is being added to the atmosphere which was removed tens of thousands of years ago. In contrast, animals are recycling carbon; crops grown as animal fodder remove CO_2 from the atmosphere. A similar principle applies to every biological source of methane: rice production, termites, and wild animals. If only the emission is considered, and the cycle of atmospheric CO_2 removal is ignored, then the apparent contribution of biological sources to the greenhouse effect will be seriously overstated.

• **Uncertainty About Sources of Methane.** Estimates are available for major methane contributors (Table 1). Of the total, ruminant animals are estimated to contribute about 15 percent of the total. However, this is a rough number. Actual emissions per animal are highly irregular, varying from region to region, and dependent on numerous factors, such as temperature and feed quality. Further, these estimates ignore potential methane released from manure. One has to wonder how an agreement regulating these various sources could ever be implemented.

• **Short Methane Residence Time.** The proposed weighting scheme ignores the fact that methane has a much shorter atmospheric residency than does CO_2. Once this factor is taken into account, CO_2 emissions account for 80 percent of the contribution to global warming, suggesting that emphasis should remain on CO_2. This conclusion is even more important in light of the recent agreement to phase out most chlorofluorocarbons by the year 2000. If this goal is accomplished, the contribution of CO_2 after the year 2000 will approach 90 percent.

• **Bovine Methane Reduction Costly.** Empirical data show clearly that switching to fluorescent lights, changing from coal to natural gas for fuels, and even tree plantations are much less costly than changing the diets of bovine animals in order to reduce bovine methane (Table 2). The $352 per ton CO_2 equivalent is quite high compared to the other three alternatives.

Table 2: Cost Estimates of Various Greenhouse Gas Reduction Goals

Strategy	Dollar/CO_2 Equivalent Metric Ton
Compact Fluorescents	$ -56
Fuel Switching (Coal to Natural Gas)	22
Tree Plantations	54
Cow Diet	352